

What is claimed:

1. A wireless user terminal having radio frequency (RF) communication capability, comprising:
 - a digital baseband;
 - an RF section;
 - an analog baseband coupling said digital baseband to said RF section, wherein said analog baseband further comprises a delta-sigma digital-to-analog converter having a digital input and an analog output comprising:
 - a storage means having stored outputs of a delta-sigma converter fed by a number of predetermined interpolated samples corresponding to all possible values of said digital input; said storage means coupled to receive said digital input;
 - a plurality of digital-to-analog converters coupled to said storage means to receive said stored outputs, said plurality of digital-to-analog converters clocked by multi-phase clocks wherein each phase applied to each of said plurality of digital to analog converters is delayed with respect to a next one by an oversampling period equal to the Nyquist period divided by the number of predetermined interpolated samples; and
 - a summer coupled to said plurality of digital-to-analog converters for summing all output from said plurality of digital-to-analog converters to generate said analog output.
2. The wireless user terminal of claim 1 wherein said storage means is a read/write programmable memory.
3. The wireless user terminal of claim 1 wherein said storage means is a read only memory.
4. The wireless user terminal of claim 1 wherein said wireless user terminal is a cellular handset.

5. The wireless user terminal of claim 1 wherein said digital baseband further comprises:

- a digital signal processor (DSP);
- a microcontroller unit (MCU) coupled to said DSP; and
- an ASIC backplane coupled to said DSP and said MCU.

6. The wireless user terminal of claim 1 wherein analog baseband comprises an audio interface coupled to said DSP and to a speaker and a microphone.

7. The wireless user terminal of claim 1 wherein said analog baseband comprises an RF interface coupled to said DSP and to said RF section.

8. The wireless user terminal of claim 1 wherein said analog baseband comprises an audio interface coupled to said DSP and to a speaker and a microphone and an RF interface coupled to said DSP and to said RF section.

9. The wireless user terminal of claim 1 wherein said RF section comprises a receiver coupling said RF interface to an antenna and to a power amplifier.

10. The wireless user terminal of claim 9 wherein said RF section further comprises a modulator coupling said RF interface to a power amplifier.

11. The wireless user terminal of claim 10 wherein said RF section further comprises a synthesizer coupled to said modulator and to said receiver.

12. The wireless user terminal of claim 1 further including a user display and a keyboard coupled to said digital baseband.

13. The wireless user terminal of claim 5 further including a user display and a keyboard coupled to said MCU.

14. The wireless user terminal of claim 7 wherein said delta-sigma digital-to-analog converter is located within said RF interface.

15. A radio frequency (RF) enabled communications system, comprising:
a base station; and
a wireless user terminal capable of communicating with said base station via radio frequency (RF) communication, said wireless user terminal further comprising:

a digital baseband;

an RF section;

an analog baseband coupling said digital baseband to said RF section,
wherein said analog baseband further comprises a delta-sigma digital-to-analog converter having a digital input and an analog output comprising:

a storage means having stored outputs of a delta-sigma converter fed by a number of predetermined interpolated samples corresponding to all possible values of said digital input; said storage means coupled to receive said digital input;

a plurality of digital-to-analog converters coupled to said storage means to receive said stored outputs, said plurality of digital-to-analog converters clocked by multi-phase clocks wherein each phase applied to each of said plurality of digital to analog converters is delayed with respect to a next one by an oversampling period equal to the Nyquist period divided by the number of predetermined interpolated samples; and

a summer coupled to said plurality of digital-to-analog converters for summing all output from said plurality of digital-to-analog converters to generate said analog output.

16. The radio frequency (RF) enabled communications system of claim 15 wherein said storage means is a read/write programmable memory.

17. The radio frequency (RF) enabled communications system of claim 15 wherein said storage means is a read only memory.

18. The radio frequency (RF) enabled communications system of claim 15 wherein said wireless user terminal is a cellular handset.

19. The radio frequency (RF) enabled communications system of claim 15 wherein said digital baseband further comprises:

- a digital signal processor (DSP);
- a microcontroller unit (MCU) coupled to said DSP; and
- an ASIC backplane coupled to said DSP and said MCU.

20. The radio frequency (RF) enabled communications system of claim 15 wherein analog baseband comprises an audio interface coupled to said DSP and to a speaker and a microphone.

21. The radio frequency (RF) enabled communications system of claim 15 wherein said analog baseband comprises an RF interface coupled to said DSP and to said RF section.

22. The radio frequency (RF) enabled communications system of claim 15 wherein said analog baseband comprises an audio interface coupled to said DSP and to a speaker and a microphone and an RF interface coupled to said DSP and to said RF section.

23. The radio frequency (RF) enabled communications system of claim 15 wherein said RF section comprises a duplexer coupling a receiver and a power amplifier to an antenna.

24. The radio frequency (RF) enabled communications system of claim 23 wherein said RF section further comprises a modulator coupling a synthesizer to said power amplifier and said receiver coupled to said synthesizer.

25. The radio frequency (RF) enabled communications system of claim 24 wherein an input of said modulator is coupled to an output of said RF interface and an output of said receiver is coupled to an input of said RF interface.

26. The radio frequency (RF) enabled communications system of claim 15 further including a user display and a keyboard coupled to said digital baseband.

27. The radio frequency (RF) enabled communications system of claim 19 further including a user display and a keyboard coupled to said MCU.

28. The radio frequency (RF) enabled communications system of claim 21 wherein said delta-sigma digital-to-analog converter is located within said RF interface.

29. A wireless user terminal having radio frequency (RF) communication capability, comprising:
a digital baseband;
an RF section;
an analog baseband coupling said digital baseband to said RF section, wherein said analog baseband comprises:

a storage means having stored compressed outputs of a delta-sigma converter fed by a number of predetermined interpolated samples corresponding to all possible values of said digital input; said storage means coupled to receive said digital input;

an expansion unit coupled to said storage means for expanding said compressed outputs;

a plurality of digital-to-analog converters coupled to said expansion unit to receive said expanded stored outputs, said plurality of digital-to-analog converters clocked by multi-phase clocks wherein each phase applied to each of said plurality of digital to analog converters is delayed with respect to a next one by an oversampling

period equal to the Nyquist period divided by the number of predetermined interpolated samples; and

a summer coupled to said plurality of digital-to-analog converters for summing all output from said plurality of digital-to-analog converters to generate said analog output.

30. A wireless user terminal having radio frequency (RF) communication capability, comprising:

circuitry for providing a digital baseband function;

circuitry for providing an RF function;

circuitry for providing an analog baseband function, said circuitry for providing an analog baseband function being coupled to said circuitry for providing a digital baseband function and said circuitry for providing an RF function, wherein said circuitry for providing an analog baseband function comprises:

a storage means having stored compressed outputs of a delta-sigma converter fed by a number of predetermined interpolated samples corresponding to all possible values of said digital input; said storage means coupled to receive said digital input;

an expansion unit coupled to said storage means for expanding said compressed outputs;

a plurality of digital-to-analog converters coupled to said expansion unit to receive said expanded stored outputs, said plurality of digital-to-analog converters clocked by multi-phase clocks wherein each phase applied to each of said plurality of digital to analog converters is delayed with respect to a next one by an oversampling period equal to the Nyquist period divided by the number of predetermined interpolated samples; and

a summer coupled to said plurality of digital-to-analog converters for summing all output from said plurality of digital-to-analog converters to generate said analog output.

31. A radio frequency (RF) enabled communications system, comprising:
a base station; and
a wireless user terminal capable of communicating with said base station via radio frequency (RF) communication, said wireless user terminal further comprising:
circuitry for providing a digital baseband function;
circuitry for providing an RF function;
circuitry for providing an analog baseband function, said circuitry for providing an analog baseband function being coupled to said circuitry for providing a digital baseband function and said circuitry for providing an RF function, wherein said circuitry for providing an analog baseband function comprises:
a storage means having stored compressed outputs of a delta-sigma converter fed by a number of predetermined interpolated samples corresponding to all possible values of said digital input; said storage means coupled to receive said digital input;
an expansion unit coupled to said storage means for expanding said compressed outputs;
a plurality of digital-to-analog converters coupled to said expansion unit to receive said expanded stored outputs, said plurality of digital-to-analog converters clocked by multi-phase clocks wherein each phase applied to each of said plurality of digital to analog converters is delayed with respect to a next one by an oversampling period equal to the Nyquist period divided by the number of predetermined interpolated samples; and
a summer coupled to said plurality of digital-to-analog converters for summing all output from said plurality of digital-to-analog converters to generate said analog output.